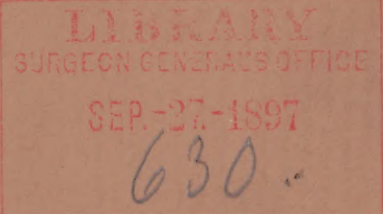

THE INFLUENCE OF SCHOOL LIFE UPON THE HEALTH OF
CHILDREN.

By WILLIAM W. JOHNSTON, M. D.

WASHINGTON, D. C.



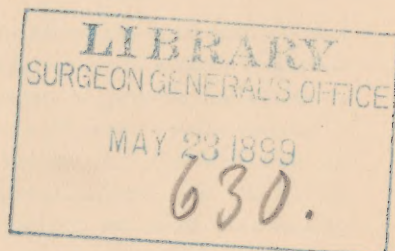
Presented by the author

MONTHLY ESSAY, READ BEFORE
THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA,
APRIL 27, 1897.

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The report of the United States Commissioner of Education for 1892 and 1893 (1)* shows that, at that time, there were 19,552,491 persons in this country between 5 and 18 years of age. Of these 13,510,719 were enrolled in the public primary, grammar and high schools. The value of school property was \$398,435,000; to support this enormous establishment the average expenditure per capita of population was \$2.47. Hartwell (2) says that in 1894, 90 per cent of the population of Massachusetts, between the ages of 5 and 15, attended school; this number exceeding by 80,000 three times the number of persons of all ages engaged in agricultural pursuits in 1885, and falling but little short of the total number of those occupied in all the manufacturing industries of the state in the same year.

The influence of education upon health

is not a new subject. Whether the school system of the United States has a favorable or unfavorable effect upon health is undetermined. Directly contrary opinions are held both among the laity and the medical profession of this country.

No serious effort has been made in this country, so far as I am aware, to gather such an amount of precise information, as would be sufficient to serve as a basis for correct judgment. For scientific and thorough investigations into the health of school children we must turn to Europe, and particularly to the monumental work of Hertel in Denmark and Axel Key in Sweden.

Why Investigations were Undertaken in this Country and in Europe.

As education became more widely disseminated and as the standard, in all grades of schools, was raised and greater demands were made upon the pupils, physicians in this country and Europe

*The figures in brackets in the text refer to the bibliography at the end of this article.

began to observe a variety of morbid phenomena in school children that they believed to be due to the conditions of school life. Interest in the subject in Europe gradually became more intense, until 1877, when Finckelburg addressed the Congress of Hygiene in Nuremberg upon the injurious effect of excessive brain work upon youth (3). Immediately after this, congresses, academies, parliaments and commissions inaugurated investigations into the health of school children, and later, journals began to be published devoted solely to this topic.

How and Where Inquiries were Conducted.

Many of the investigations pursued in European States were limited to the eye sight, or were of a personal character, and restricted in scope. But there were at least five series of investigations that were far reaching and three of these were very careful and complete.

These five arranged according to date were:

1. Hertel's investigations in Denmark, 1881; (4).

2. Danish Commission (Hertel), 1882; (4, 5).

3. Swedish Commission (Axel Key), 1883; (6, 7).

4. British Parliamentary Commission (Crichton-Browne), report published in 1884; (8).

5. Warner's investigations in England, reported in 1892; (9, 10, 11, 12, 13, 14, 15, 16).

The facts collected in these five investigations give information as to the health of 104,629 school children (62,332 boys and 42,297 girls), of different ages, of all social conditions, rich and poor, from city and country.

6. Additional important inquiries were undertaken by Combe (17) in Lausanne in 1892; 3,650 children in all being studied.

7. Nesteroff (18, 19). in Moscow, 1890, 216 children.

8. Zahor in Prague, 1888, 1889, 1890, 4,892 children (Zeitschr. für Suchulgesundheitspf., Hamb. u. Leipz., 1892, v, 557).

9. Hakonsen-Hansen's preliminary report of the Norwegian Commission under Faye and Hald, pub. 1894, (20, 21).

Methods of Inquiry.

The methods pursued in these different investigations varied in different countries. In England, where the examinations were conducted with the idea of combining accuracy with economy of time, scholars were subjected to inspection while at work and play, and both they and their teachers were questioned. This plan is open to criticism and the unfavorable comments of the chief inspector of schools who accompanied Crichton-Browne, seem to be not without justice.

In Denmark and Sweden it was accuracy without economy of time which dictated the method of inquiry, and the plans were essentially the same in the two countries, and were very detailed and complete. Printed blanks containing questions as to each child's health, the amount of study at home, the character and duration of sleep, etc., were sent to the parents to be answered. The information thus obtained was submitted first to the family physician and then to the child's teacher for criticisms, corrections and additions, and afterwards the child's eyesight was tested and the weight was ascertained. These studies were made in November and December in Denmark, and in February and March in Sweden. The periods chosen were neither at the beginning of the school year, when the pupils were refreshed by their summer holidays (of ten weeks duration in Denmark and 16 weeks in Sweden) nor at

the end of the session after the fatigue of the year's work.

In a doubtful case the child was called well, and no incidental acute illness was included.

Investigations in the United States.

Interest in the health of the school children of the United States was awakened when the subject began to be accurately and scientifically investigated in Europe. For a short time considerable enthusiasm was shown in different localities, particularly in Michigan, Wisconsin, Maryland and Massachusetts, but it soon died out with the exception of a few spasmodic revivals.

Numerous articles bearing on the question have appeared from time to time in medical journals, reports of school boards, of boards of health, in text books of medicine and hygiene, pedagogical journals, and in the reports of the United States Commissioner of Education. These articles with few exceptions have been of a general character, and do not include observations on any extended scale.

The school children of this country, in some localities, have been weighed and measured, and several investigations into eye conditions and a very few inquiries of a more general character have been undertaken; but as far as I know no thorough examination of the state of health of pupils in American public schools has been made. In a few instances circular letters have been sent out by individuals to physicians, superintendents of schools, members of school boards, and the clergy and from the replies received an effort has been made to reach some exact conclusions. The answers were, however, simply expressive of individual opinion, and the method lacked comprehensiveness and thoroughness. The number of scholars studied was small, and the answers to the ques-

tions vague and lacking in scientific precision; the accumulated data and conclusions were therefore of no great value.

Facts ascertained by inquiries in Europe.

The European investigations showed very clearly that there was a surprising amount of ill health among school children, that the percentage of morbidity varied slightly in different countries, and that girls suffered more than boys.

Thus in boys schools in England there was found a morbidity of 20.7 per cent, (Warner); in Denmark, 29 per cent, (Danish Commission); in Copenhagen, 31.1 per cent, (Hertel); and in Sweden, 37.2 per cent, (Swedish Commission.)

In girls schools there was discovered a morbidity in England of 15.6 per cent, (Warner); in Copenhagen, 39.0 per cent, (Hertel); in Denmark, 41.0 per cent, (Danish Commission); in Lausanne, 42.9 per cent, (Combe), and in Stockholm, 61.7 per cent, (Swedish Commission).

In arriving at these figures, accidental or acute illness and short sight were excluded. As a rule morbidity was greatest among the scholars of the better social class.

A number, of chronic conditions varying in degree from slight deviations from the normal state of health to actual disease, made up the sum total of morbidity.

The following conditions found in Denmark and Sweden were considered abnormal and formed the basis for the estimation of a morbidity percentage; chlorosis, epistaxis, anorexia, nervousness, headache, short sight, other eye affections—excepting ophthalmia—spinal deformities, scrofula, etc.

In England, Warner discovered defective development, abnormal "nerve signs" low nutrition, mental dullness, "eye cases" (ophthalmia excluded), lateral curvature of the spine, etc.

Crichton-Browne, in the London elementary schools, bases his statistics upon

the presence of nervous disturbances, habitual headache, sleeplessness, muscular twitchings, stammering, neuralgia, short sight, squint, etc,

According to Hakonson-Hansen the principal defects among the girls of the Christiania (Norway) schools, were found to be anemia, neurotic conditions, headache, chronic digestive disturbances and spinal deformities.

Facts Ascertained by Inquiries in the United States.

Examinations into the morbidity of the school children of the United States have been so few and so fruitless that the superintendent of physical training in the Boston public schools was able to say without fear of contradiction as late as 1894, that we have no knowledge whether school life is beneficial or prejudicial to health, since no one has taken the pains or been paid to find out. He continues: "It is scarcely too much to say that it would be easier under the present conditions to estimate the losses entailed by hog cholera or cattle plague throughout the Union, than to determine the number of children who succumbed annually to school diseases in the United States." Hartwell (2). Whenever investigations have been made in this country the conditions found have been similar to those in Europe.

Relation of these Variations from Health to School Life. Are they Constant, and are they Due to the Conditions of School Life?

The same morbid phenomena have been met with so repeatedly in the different inquiries undertaken that they may be said to be constant accompaniments of school life, and Key calls chlorosis, nose bleed, headache and myopia true school diseases. In certain schools in the south of Scotland, where the children lived and worked amid the most favorable surroundings, the same varie-

ties of ill health were observed by Crichton-Browne, though with less frequency and in a less pronounced degree than in less favored localities.

a. Contral experiments.

As pointed out by Burgerstein (6)—who translated Axel Keys report into German—we cannot fix upon a normal percentage of morbidity because we cannot find a number of children brought up under ideal circumstances or in an ideal environment. Since nearly every child of school age goes to school, there are not a sufficient number of children out of school for control observations. It makes but little difference whether the health of school children is better or worse than in the case of those who do not go to school; it is bad enough and should be made better; the condition exists and it is our duty to remedy it.

b. Relation of morbidity to age and progress from class to class.

To aid in determining whether the ill health constantly found in school children is due to the conditions of school life, it will be well to study the relation of morbidity to age and the progress from class to class.

All observers agree that morbidity increases with age and more particularly with progress from class to class, and statistical corroboration of these facts is abundant and strong. The results of the investigations of the Swedish Commission, arranged by Key in the form of a curve, and the combined results of the Danish and Swedish Commission and of Hertel's personal inquiry, similarly arranged by the latter, illustrate these points most graphically. The reader is referred to the reports of Key and Hertel, since these curves are too complicated to be introduced here.

It has been demonstrated thus far that:

1. In Europe there is considerable ill health among children who attend schools.

2. Wherever and whenever investigations have been undertaken the same diseases and deviations from normal health have been constantly found; and

3. The percentage of morbidity increases with age but more particularly with progress through classes.

For further inquiry let us select certain conditions that from the physical characteristics of our people, are likely to be met with in this country, (and in regard to some of which observations have been made in the United States), and try to discover to what extent these conditions are met with among European and American school children, and how they are aggravated by school life.

The Eye Sight.

The prevalence of near sight and its increase with age and with progress from class to class in the children of European schools has been noted by a large number of observers. The Swedish Commission found an increase in near sight from 6 per cent in the lowest to 37.3 per cent in the highest classes of certain boy's schools, and this increase was always found to bear a direct relation to the length and amount of study. In girls' schools the same investigators found a gain in near sightedness from 7.1 per cent at eight years of age to 57.1 per cent in the 22d year or over. Seggel (31) noted an increase of near sight from 16.5 per cent in the 1st to 54 per cent in the 8th class of the Munich intermediate schools. In the London elementary schools 2.5 per cent of the scholars in the 1st class and 9.2 per cent in the 6th class were found to be near sighted.

Cohn of Breslau (22) whose name is familiar to all ophthalmologists, maintains:

1. That myopia increases with the demands made upon the eyes.

2. That the number of short sighted scholars increases regularly from the

lower to the higher classes in educational institutions.

3. That myopia not only becomes more common, but worse in degree with advance from class to class.

In an examination of 10,000 children of all grades he found:

1. In country schools 1 per cent of short sight.

2. In elementary schools 5.11 per cent.

3. In grammar schools 20.40 per cent.

4. In colleges 30.35 per cent.

5. In University of Tubingen 79 per cent.

In 1896 Carter (23), among 8,125 children in the London schools, discovered that but 39.15 per cent enjoyed normal vision. Numerous other authorities could be quoted if necessary to prove that near sight exists in European schools, and that it increases in frequency and degree as pupils advance from the lower to the higher grades.

In the United States many ophthalmologists have examined the eyes of many thousands of school children, and there is an abundant literature upon this subject. The results obtained by different investigators agree with each other and are, in many respects, similar to those observed in Europe. According to D. B. Smith (22) in children under 6 myopia is rare. From 7 to 12 years it increases 1 per cent a year; from 12 to 14 years, $4\frac{1}{2}$ per cent a year; from 14 to 18 years of age the percentage of increase is greater.

Examinations made in the Cincinnati schools (17) showed an increase in near sight from ten per cent in the intermediate to fourteen per cent in the high and sixteen per cent in the normal schools. In Memphis short sight was found to increase from almost nothing in the lowest to fifteen per cent in the highest classes.

In Columbus the increase was from

almost nothing to 11.3 per cent at seventeen years.

A similar condition of affairs was found in Kansas City and elsewhere.

In Circular of Information No. 6 of the U. S. Bureau of Education (1881) Calhoun (24) says that the report of the examination of 45,000 school children in the U. S. irrespective of age, sex, color, in city and country, show that near sight increases from nothing in the lowest to 60 to 70 per cent in the highest classes (sic).

The grade or degree of near sight increases as well as its frequency. Many more facts could be brought forward in proof, but those quoted are sufficient to show that school life has a deleterious effect upon the eyes of children.

Diseases or disturbances of the nervous system. Nervousness, nerve instability, neurasthenia.

Nesteroff (18) studied the school children of Moscow with a view of determining if diseases or disturbances of the nervous system existed and how they were influenced by school life. Examinations extending over four years showed 29.25 per cent of the children in the schools thus affected. No distinctive disease marked by typical objective signs was met with, but the pupils were found to suffer from general disturbances of the nervous system chiefly neurasthenic in character. There was headache, (especially at the end of the day's lessons) with sleeplessness, gastralgia, peripheral neuralgias—mostly intercostal—neuroses of the heart (palpitation), rapidly induced psychic and mental weariness, accompanied by irritability and excitement, and in older pupils neuroses of the sexual apparatus.

Nesteroff's data show conclusively that these diseases or disturbances of the nervous system increase with age and with progress through classes—e. g.,

from 8 per cent in the 1st to 69 per cent in the 8th class, and from a little over 8 per cent at 10 years of age to nearly 78 per cent at the age of 19.

Warner has investigated the same subject in England. In about 11 per cent of the children examined he noted certain abnormal "nerve signs." These consisted in instability in posture, in balance of hand, head and back; loss of tone in the orbicular muscle of the eye; finger twitching; stammering; numerous small movements, occurring without apparent stimulation, and muscular eccentricity closely bordering on chorea.

The frequency and severity of nervous diseases in school children is further proved by the reports of the Registrar General of England (2), which shows that while deaths from zymotic diseases in children has considerably diminished, the morbidity from diseases of the nervous system has remained stationary.

In Massachusetts the proportion of deaths from diseases of the nervous system to deaths from all causes increased in the decade 1880-1890.

Among the public school children of New York city, Hamilton (25), in answer to inquiries, ascertained that 20 per cent of the pupils in the primary schools (average age 7 years) and two per cent of those in the grammar schools (average age 12 years) twitched their hands, faces or one side of the body. His observations show that contrary to the conclusions of others, there is a lower percentage of nerve disorders in the higher grades.

Lincoln (26), Folsom (26) and others, describe the familiar nerve—sick school child, but add nothing to our knowledge of the prevalence of nervous disease among the pupils in our schools.

Headache.

Is headache met with in school children and does school life increase or di-

minish its frequency and severity?

Inquiry by Guilleme in Paris, and Becker in Darmstadt, by Faye and Hald in Germany and others, (26, 8, 20) have shown that from 40 to 50 per cent of the scholars in public schools suffer from habitual headache due to brain exhaustion from school work.

Of 6,580 pupils in the London elementary schools 46.1 per cent were found to be affected with habitual headache by Crichton-Browne. These headaches were of an anemic or neurasthenic type, the latter predominating, and were usually frontal. Girls were more often affected than boys.

It was found that there was an increase in habitual headache in relation to classes from 40.5 per cent boys and 46.2 per cent girls in the first class to 42.9 boys and 70.6 per cent girls in the sixth class.

This same thing was observed by Key in the preparatory schools of Stockholm where there was an increase from 2.2 per cent in the first to 11 per cent in the fourth class, and from four per cent at eight years of age to 44 per cent at the age of thirteen.

According to Crichton-Browne, the headache of high school girls begins with the school term, grows more frequent and intense as it progresses, and disappears in the holidays to reappear with the beginning of school life.

The same effect of alternate work and rest was noted by this same observer in the children of the London elementary schools who suffered from habitual headache. In the morning 12.4 per cent of the scholars had headache; in the afternoon 22.3 per cent, and with the evening's rest the percentage fell to 11.4.

Nesteroff observed similar headache in Moscow school children at the end of the days lessons.

The facts already mentioned are cor-

roborated by the results of investigations undertaken by Bystroff (26) in St. Petersburg. Among 7,478 school children 5 per cent of those at 8 years of age suffered from so-called school headache, and this increased to from 28 to 40 per cent between 14 to 18 years.

No data have been obtained as to the prevalence of headache in the school children of this country. Hamilton (25) sent printed blanks to the public schools of New York city; from the replies received he asserts that 10 per cent of grammar school and 15 per cent of primary school children have headache. In this instance we have the opposite of what has been always found elsewhere, namely, the existence of more headache in the younger children and lower classes.

I know of no other investigations on this subject in this country.

Sleep.

Sleeplessness, sleep talking and sleep walking, as accompaniments of neurasthenia, have been shown to be not infrequent in school children, and to be due to the conditions of school life. Crichton-Browne, notes that 38 per cent of the pupils in the London elementary schools suffer from sleeplessness, the boys showing a higher percentage than the girls; also, in one school of 381 boys he found 129 sleep talkers and 28 sleep walkers; in one school of 432 girls there were 17, and in another school of 382 girls, 20 somnambulists. This observer learned that parents frequently complained to teachers that their children talked of lessons in their sleep, and arithmetic and sums seemed to be the chief disturbing element.

Suicide.

In Prussia between the years 1883 and 1888 (*Zeitschr. für Schulgesundheitspf.*, 1892, v. 229) 289 pupils in the schools committed suicide, of whom 179 or more than one-half were in the lower classes.

Fear of examination or failure to be promoted, quarrels with teachers, morbid ambition, fear of punishment, and other incidents relating to school life, were the causes assigned by 121 of those who destroyed themselves. There is no note of such a tendency in this country, at least none upon which any reliance can be placed.

Increase of morbidity with increase of the number of hours of study.

In the Swedish and Danish inquiries the greatest care was taken to insure accuracy in determining the effect of the number of hours of study upon morbidity. The scholars were taken in small groups and every possible source of error was eliminated.

In Sweden it was found that the morbidity was 5.3 per cent higher in those who worked over the average time, and in Denmark, seven per cent. In those schools which made more than the usual demands upon the students, the per cent of sick children exceeded the average per cent of morbidity by from three to ten per cent in some classes. In the Stockholm schools, especially burdened by work, the per cent of those in bad health exceeded the average morbidity from four to seven per cent. Moreover, it was ascertained that the morbidity increased *pari passu* with the number of school hours.

One cannot fail to have been struck, from what has gone before, with the dissimilarity between the general amount of ill health in the schools of Sweden and those of Denmark. To emphasize this point it is only necessary to compare the statistics obtained by the Swedish and Danish observers, which show that the morbidity among boys in Denmark is twenty-nine per cent and in Sweden thirty-seven per cent; while among girls in Denmark it is forty-one per cent and in Sweden 61.7 per cent.

I was myself at a loss to account for this, until I ascertained that the demands upon the scholars time were greater in Sweden than in Denmark. In each country about four hours of study daily are required of the lower classes, while in the upper classes of Denmark nine to nine and a half hours, and in Sweden ten to eleven hours, are necessary. In girls schools the number of hours spent in study is far greater in Sweden than in Denmark.

In the United States the relation between the number of hours spent in study and the amount of ill health, has been investigated by competent medical men in the high schools of Cleveland, Ohio, and the results placed on record (26). These results make it quite clear that appetite, sleep, headache, backache, eye-sight, menstruation and general health were affected in direct proportion to the amount of study in hours.

There was nothing peculiar to the Cleveland high school at this time; the course of study and other conditions of school life were like those existing elsewhere.

We have, as has been seen shown, but few data upon which to form an idea of the amount, of ill health in our American schools. We have enough to prove, however, that if the amount of necessary study is a factor in producing or increasing morbidity, we had, at the time all these investigations were being conducted, no advantage over Europe, indeed we were at a disadvantage compared with the old world.

In the high schools in Michigan in 1882 thirteen hours of solid brain work were required daily (27). The Ann Arbor high schools in 1882 demanded eight hours study a day for six days, beside the time spent in recitations.

Decrease in Attendance-Causes.

It may have been observed in some of

the percentages that have been quoted that the number of scholars has diminished and the curve of morbidity declined in the last years and in the highest classes of the various schools investigated. The diminution in the size of the classes by the departure of those who left school to enter higher educational institutions or business, would have affected the morbidity percentage, if at all, by increasing it, the strong and successful going out, the sickly and backward remaining behind. This therefore cannot account for a descending morbidity curve at the end of school life. The true explanation is that the delicate and ill have fallen out, unable to keep up in the race, and the strong and lusty are left behind at school.

The robust health enjoyed by girls and young women in certain of our colleges, in spite of the severe tasks imposed upon them, is frequently used as a basis for an argument, thought to be convincing and unanswerable. It is maintained, that, because they enjoy good health, therefore there is no overpressure in our schools, and nothing wrong with our system of education. This argument is fallacious. No account is taken of the many who have collapsed in the struggle of school life. Our higher colleges for girls are attended by the fittest who have survived in this struggle.

Faye and Hald (21) have proved that the apparent increase in the health in the highest classes of the Christiania (Norway) schools is due to the elimination of the sick and fragile. In spite of this withdrawal they maintain that thirteen per cent of the picked girls who remained in school until graduation left it hampered by broken health of greater or less severity. Burgenstein (6) and others note the same thing.

But further European statistics are unnecessary, since the decrease in school

attendance by reason of illness, and its cause overpressure, is brought home to us by the results of the Cleveland investigation, already referred to. Of 800 pupils in the Cleveland high school twenty-five per cent of the girls and eighteen per cent of the boys withdrew in one year for various reasons. Seventy-five per cent of the girls who left did so wholly or in part on account of bad health and nearly fifty per cent of the boys were in bad health while at school and thirty-three per cent of those who withdrew were compelled to do so by reason of physical disability.

Winsor (30) says that out of a class of seventeen pupils at Waltham high school in Massachusetts nine were removed in their graduating year on account of ill health.

Conclusions.

From the foregoing it is clear that wherever investigations into the health of school children have been undertaken the following facts have been ascertained, namely:

1. That there is a large amount of ill health among school children.
2. That this ill health is due to a variety of diseases and disturbances of function,
3. That the same diseases and disturbances exist everywhere and are constantly present,
4. That they are aggravated by the conditions of school life,
5. That they are increased in direct proportion to the number of hours devoted to study,
6. That they often lead to a premature withdrawal from school, and are manifest in a large proportion of those who remain to the end.*

*The writer wishes to express his obligations to Dr. George W. Johnston for the collection of most of the material upon which this paper is based and for other assistance which associates him closely in its preparation.

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